Low Impact Development

An innovative, ecosystem-based approach to land development and stormwater management

Why We Need Low Impact Development

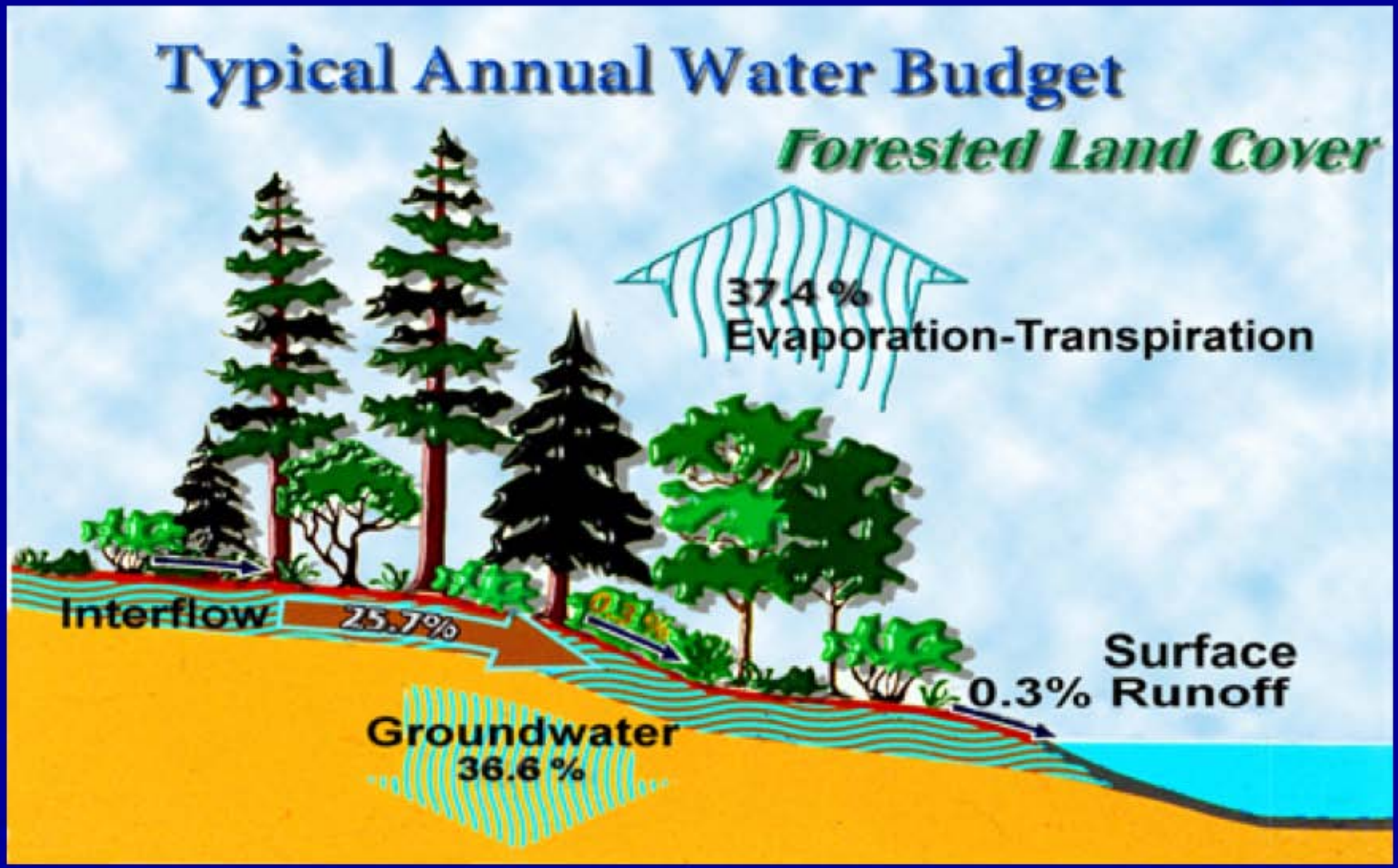
To better protect our:

- **Streams**
- **Fish and wildlife habitat**
- **Watershed hydrology**
- **Drinking water**
- **Water quality**

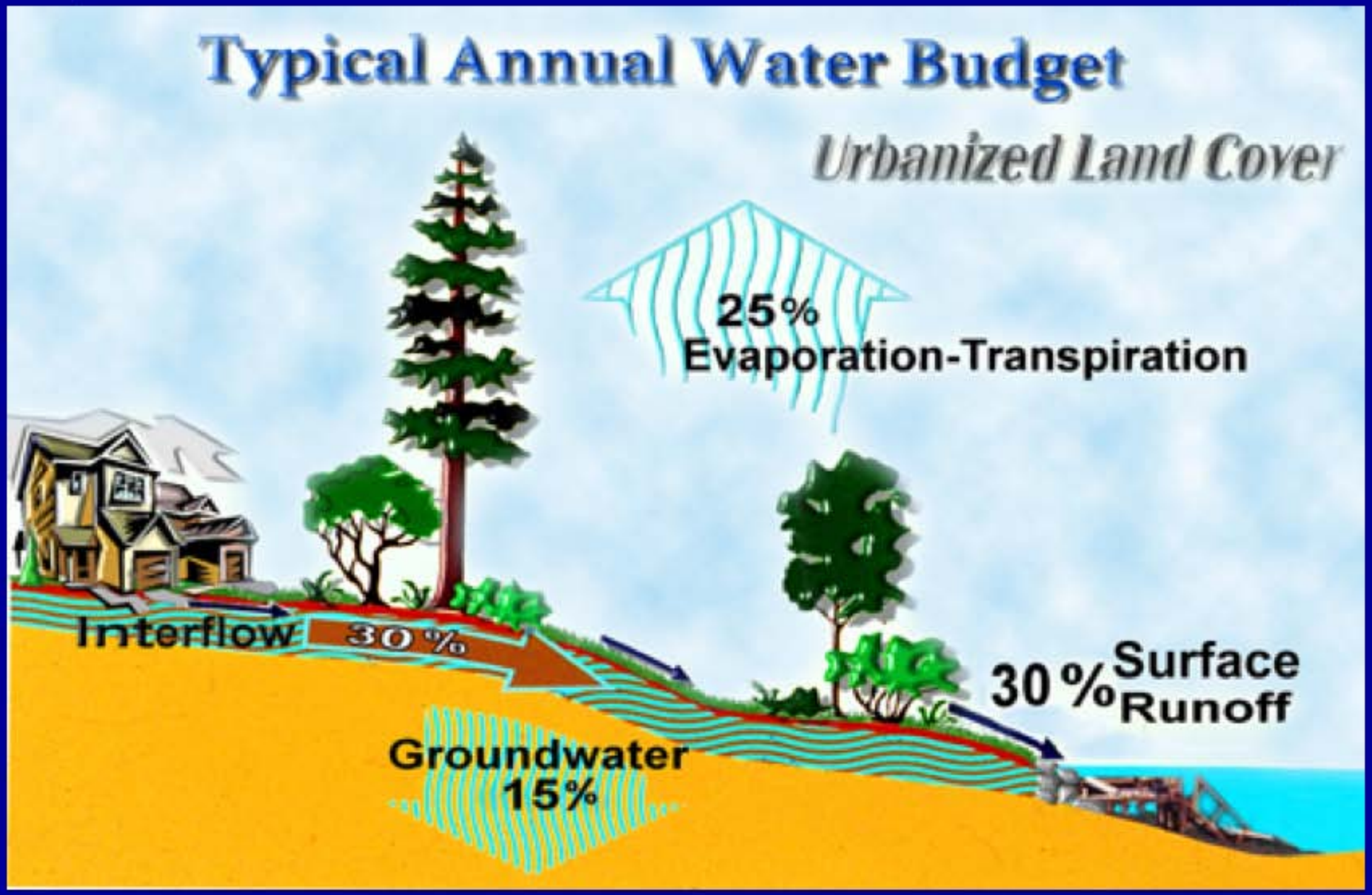
To reduce infrastructure costs

To make our communities more attractive

Natural Conditions



Developed Conditions



Primary Goal of LID

Design each development site to protect, or restore, the natural hydrology of the site so that the overall integrity of the watershed is protected. This is done by creating a "hydrologically" functional landscape.


Conventional


Low Impact


Conventional


Functional Landscape Design

Basic LID Principles

1. Conserve natural areas
2. Minimize development impacts
3. Maintain site runoff rate
4. Use integrated management practices
5. Implement pollution prevention, proper maintenance and public education programs

1. Conserve Natural Areas

- Conservation of drainages, trees & vegetation
- Land use planning
- Watershed planning
- Habitat conservation plans
- Stream & wetland buffers

2. Minimize Development Impacts

- Reduce storm pipes, curbs and gutters
- Preserve sensitive soils
- Cluster buildings and reduce building footprints
- Reduce road widths
- Minimize grading
- Limit lot disturbance
- Reduce impervious surfaces

3. Maintain Site Runoff Rate

- Maintain natural flow paths
- Use open drainage
- Flatten slopes
- Disperse drainage
- Lengthen flow paths
- Save headwater areas
- Maximize sheet flow

4. Integrated Management Practices

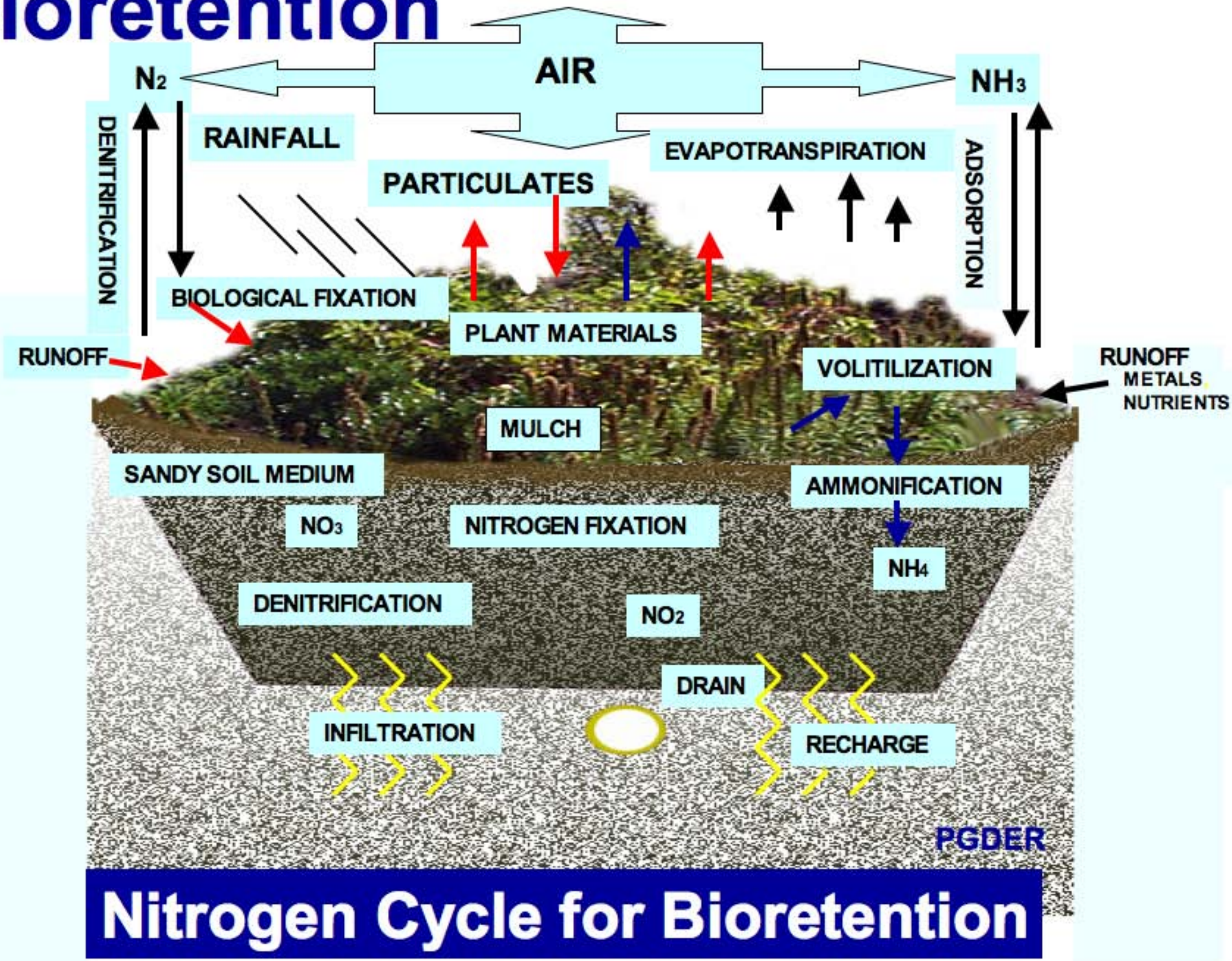
- Small-scale stormwater controls
- Distributed throughout site
- Maintain flow patterns, filter pollutants and re-create or maintain hydrology

Common Integrated Management Practices

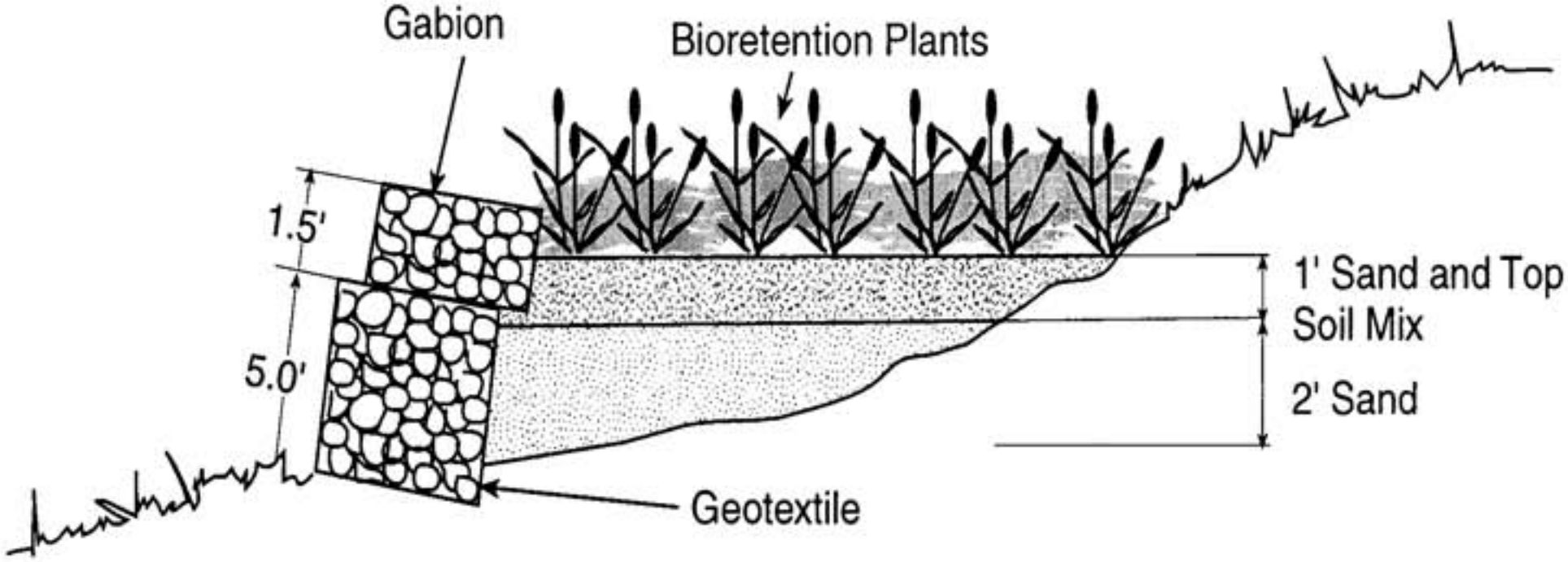
- Disconnectivity
- Bioretention
- Open Swales
- Permeable and Porous Pavements
- Green Roofs
- Soil Amendment
- Rainwater Harvesting
- Reduced Impervious Surface

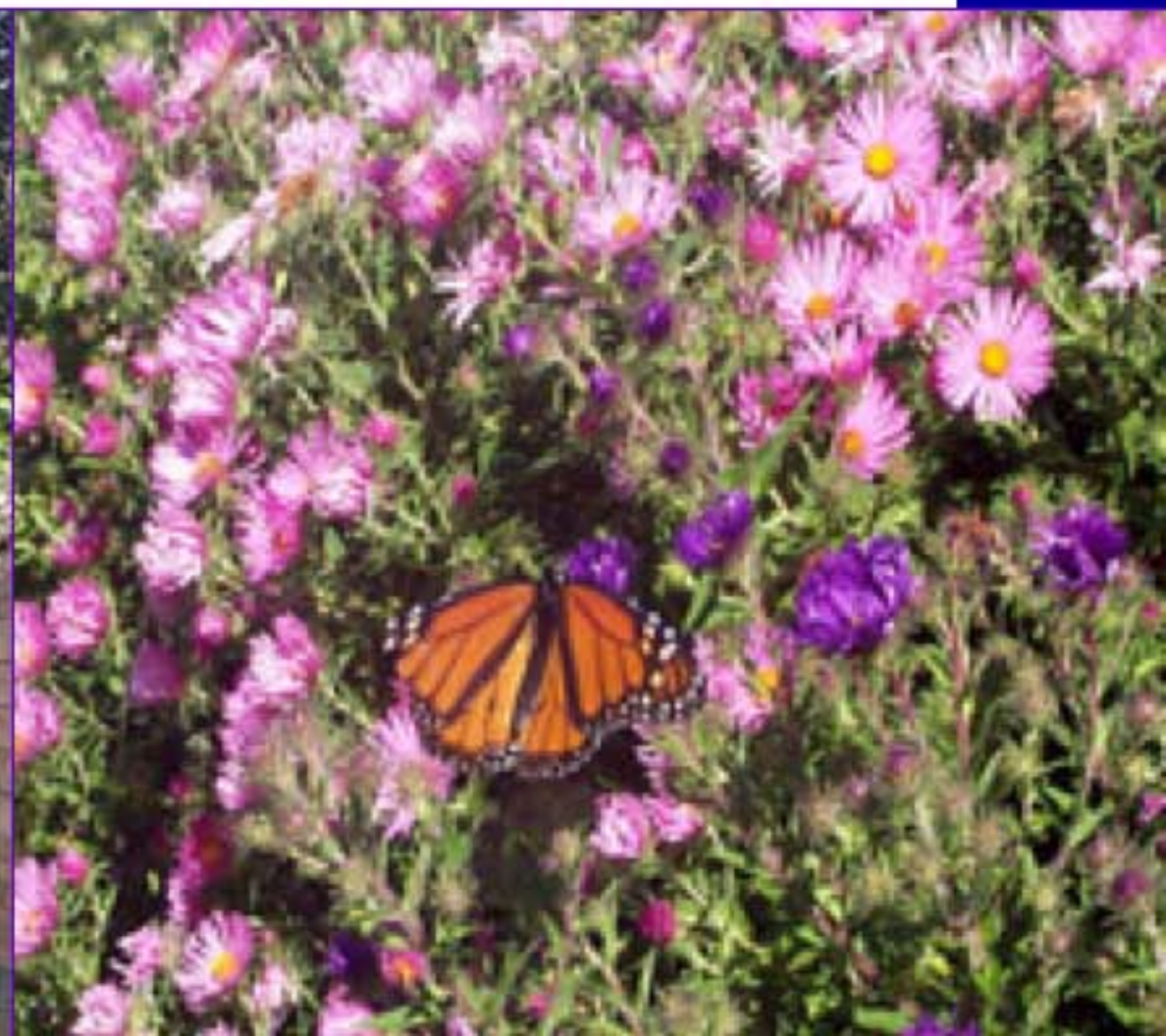
Disconnectivity

Bioretention



Nitrogen Cycle for Bioretention

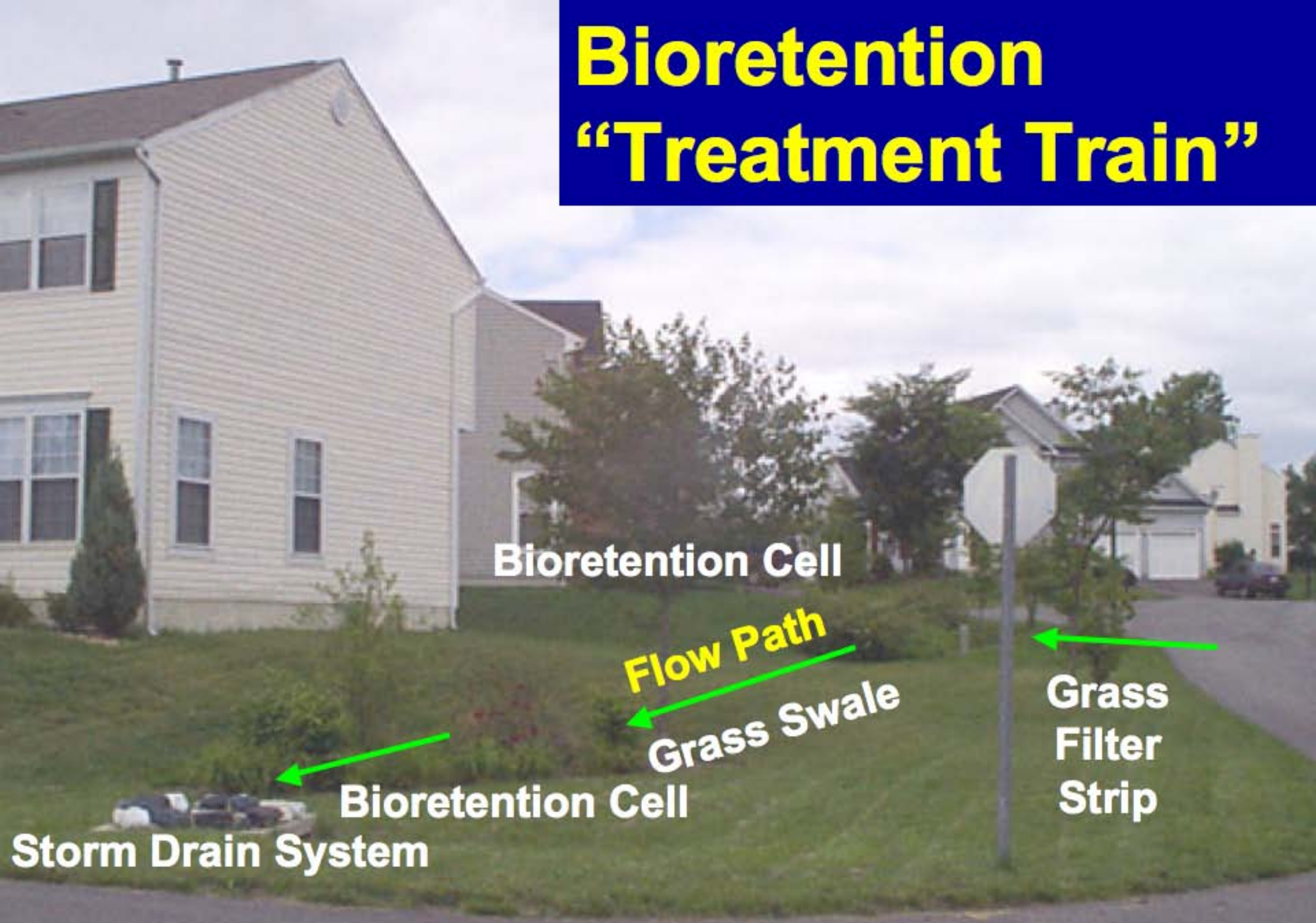

Gabion
Bioretention Plants
1.5'
5.0'
1' Sand and Top Soil Mix
2' Sand
Geotextile



Urban Revitalization

Retrofit of 1-acre parking lot using bioretention

Bioretention "Treatment Train"



Seattle's Street Edge Alternatives Program

After Completion - January 2001

Permeable Pavement

Green Roofs

Planter Boxes

Soil Amendment

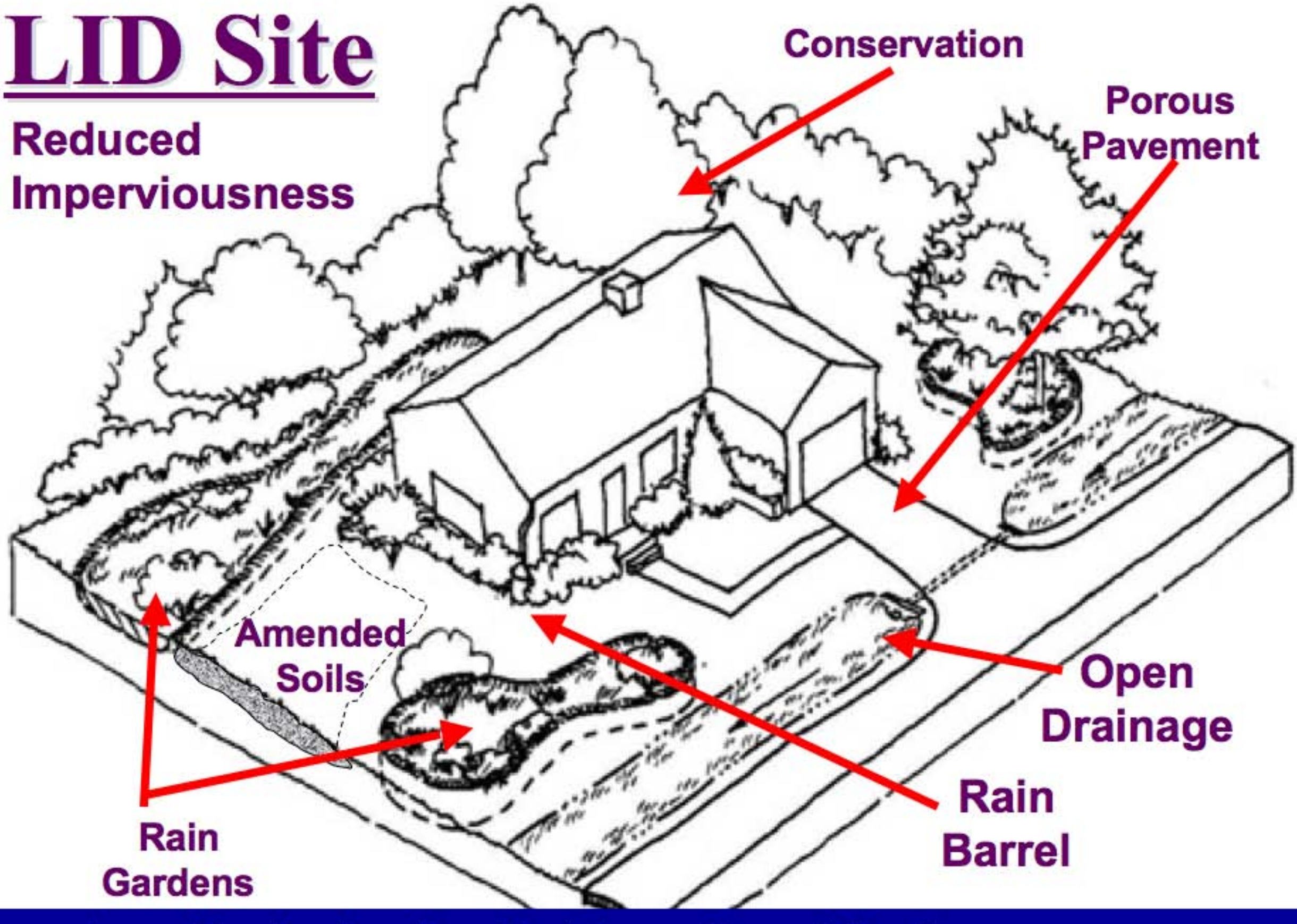
Soil aeration machine

Development at Redmond Ridge, where soils were amended to a depth of 12 inches.

Rainwater Harvesting

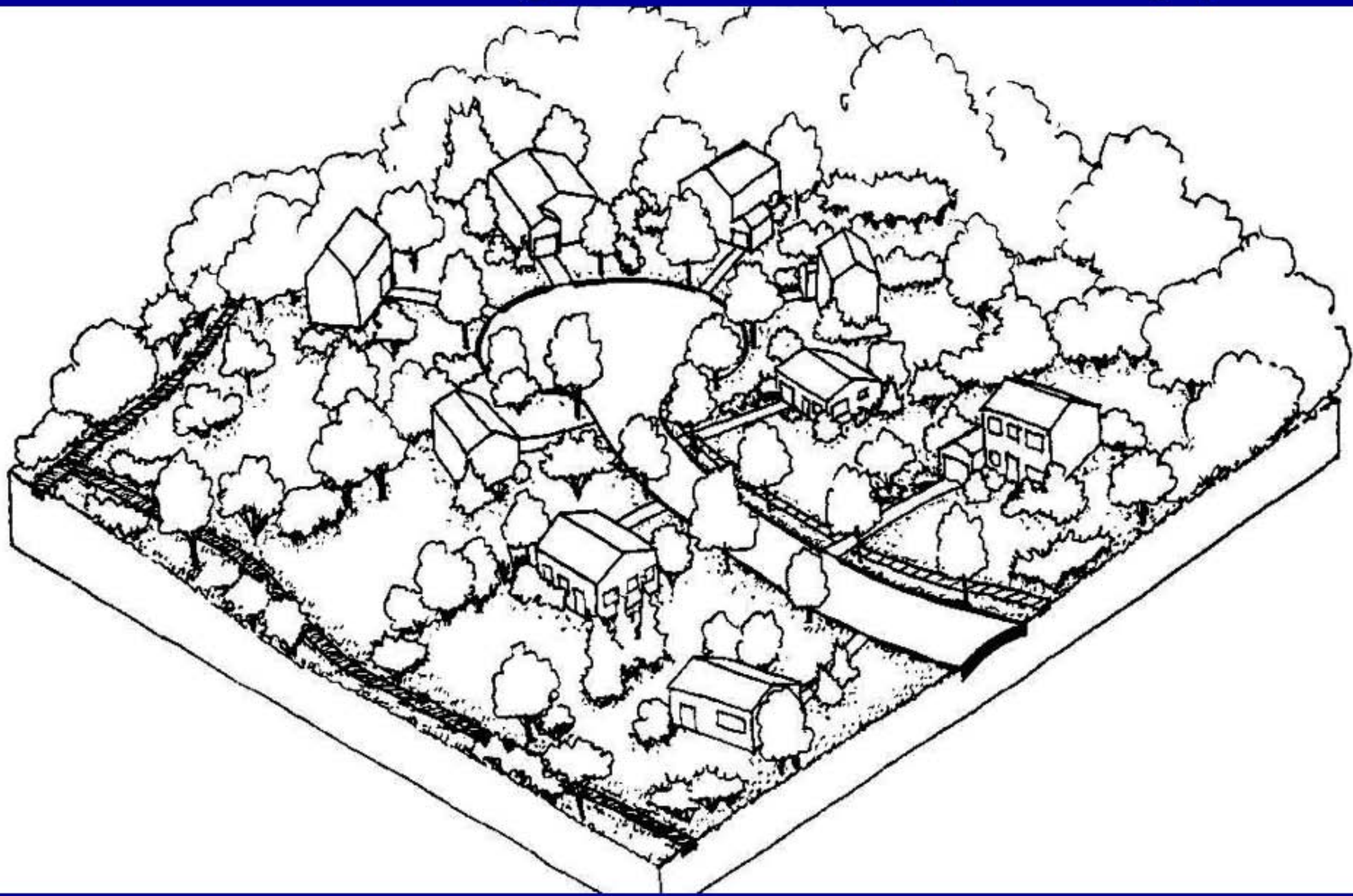
LID Site

Reduced Imperviousness



Create a Hydrologically Functional Lot

LID rebuilds ecological functions piece by piece.



Cumulative Beneficial Impacts of LID Techniques

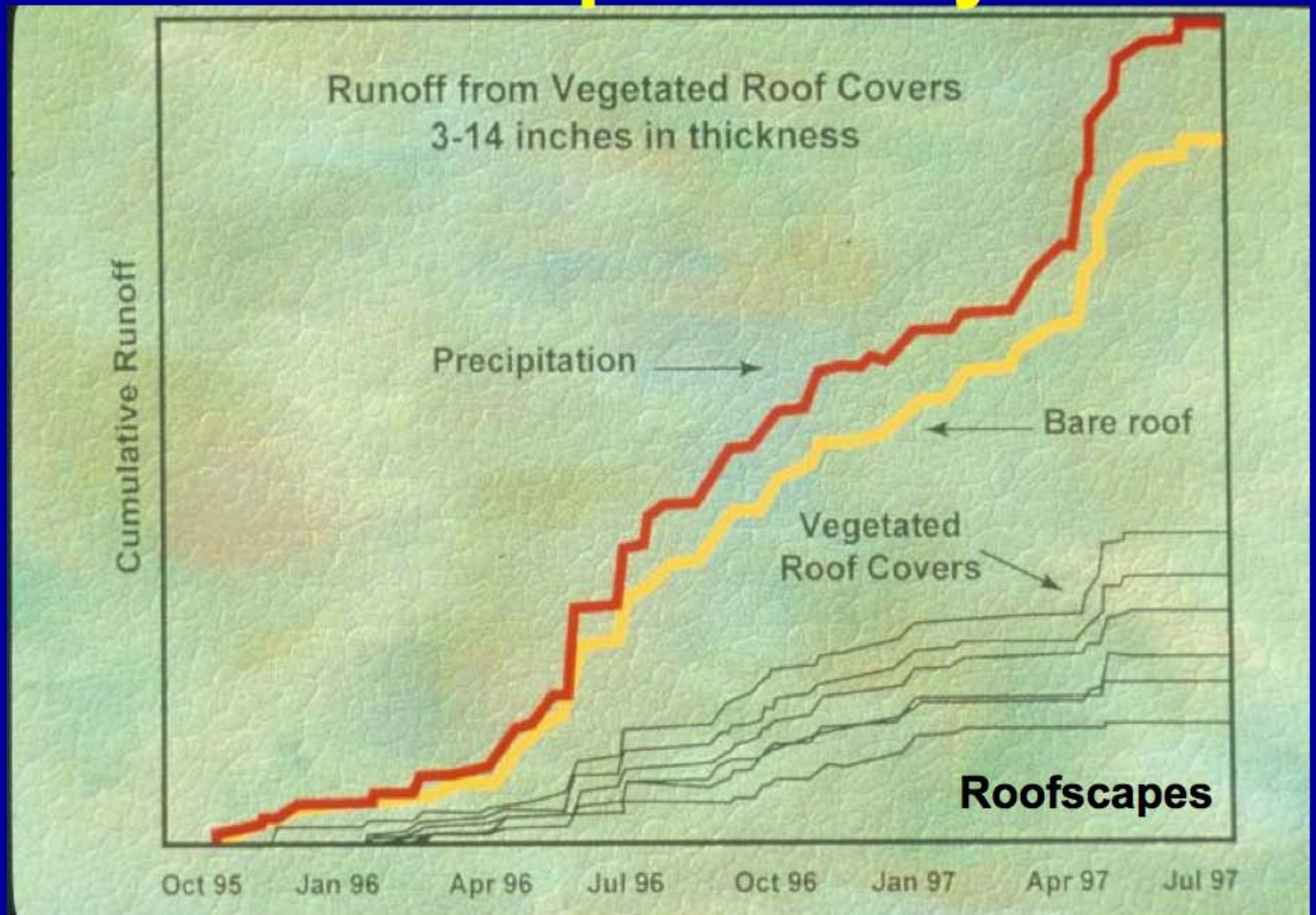
Tree conservation • Rain gardens
Narrower streets • Open drainage
On-lot detention storage and infiltration

Comparing LID and Conventional Development

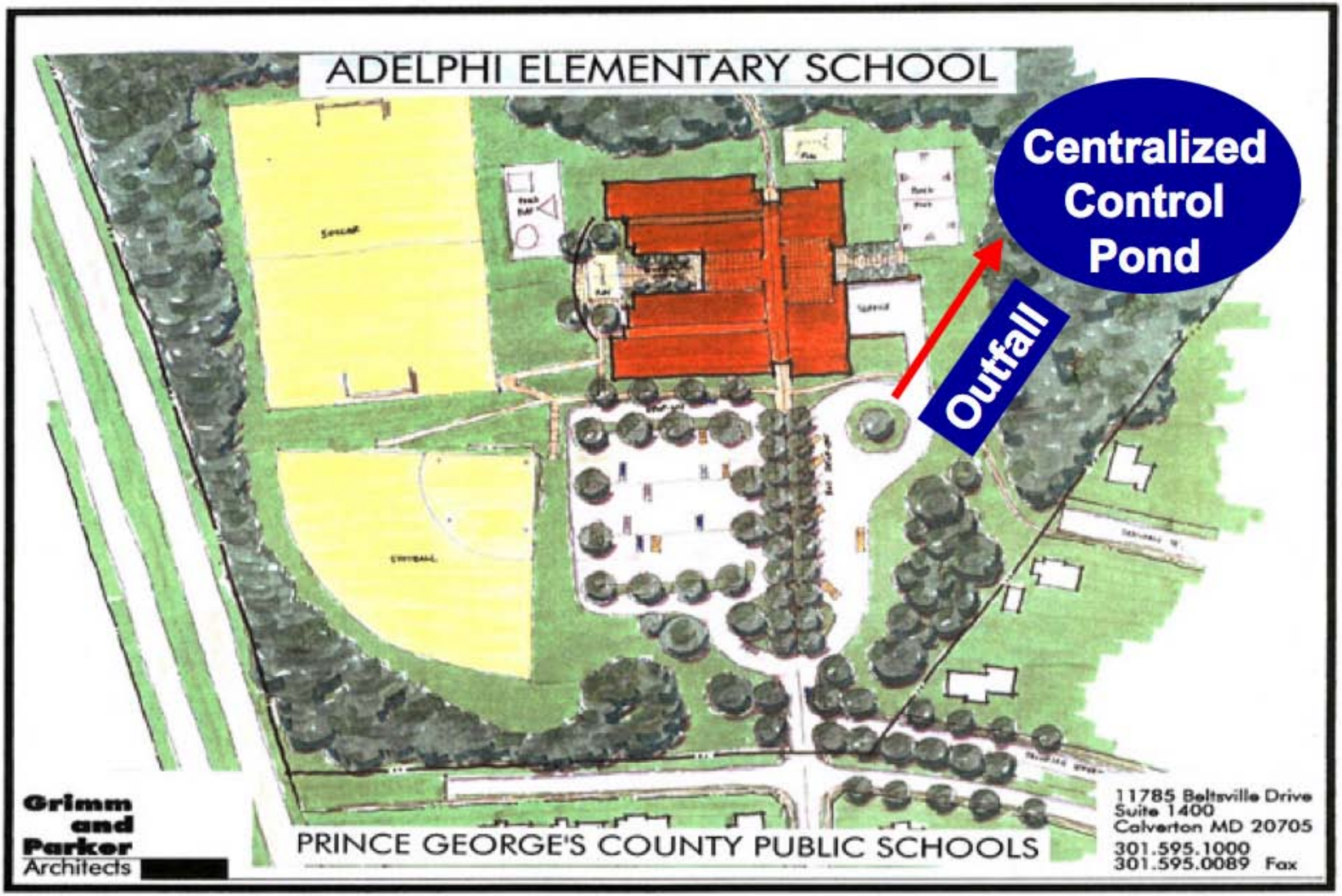
Conventional Development

LID Subdivision

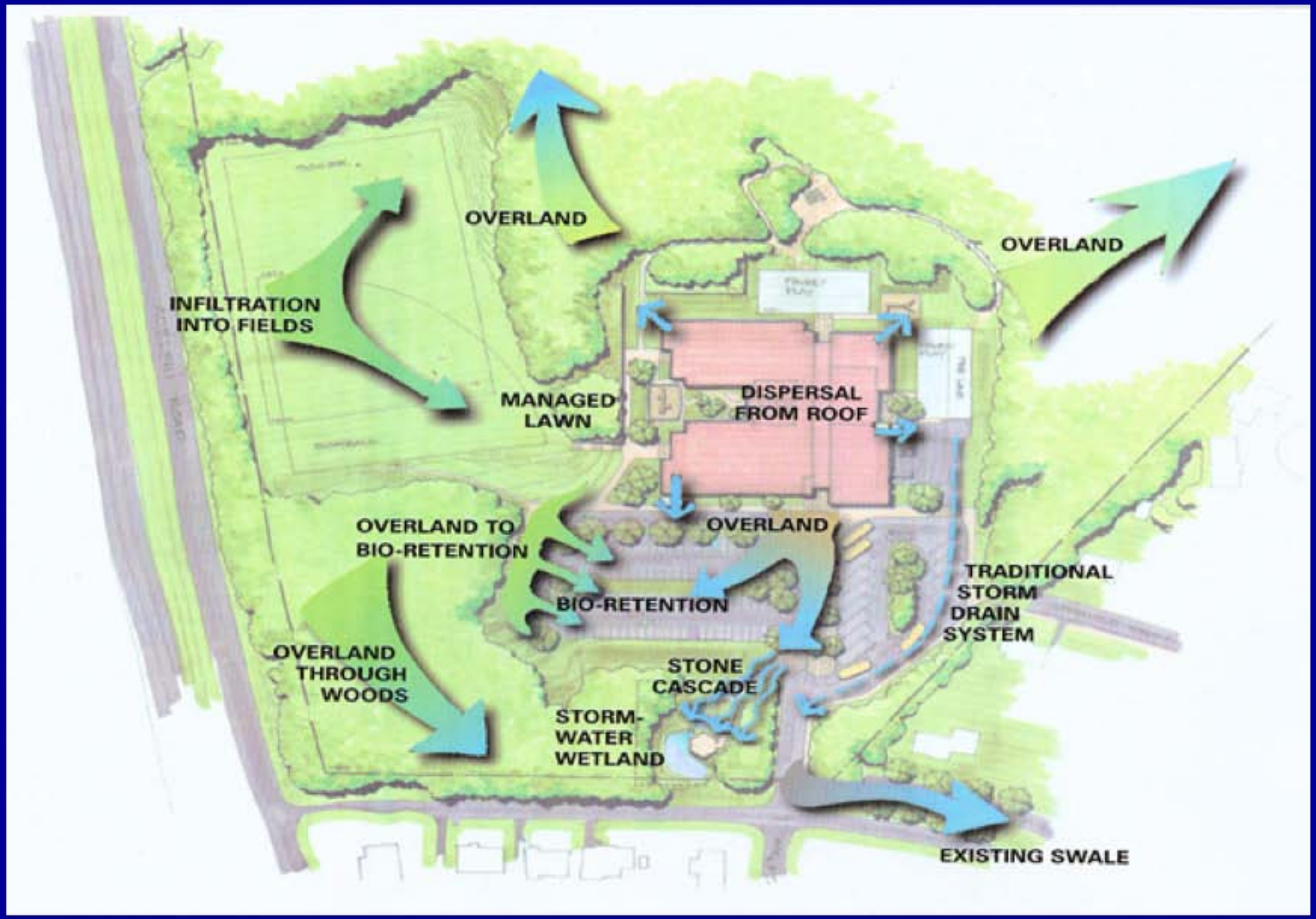
Philadelphia Study



Conventional Approach



LID Design


OVERLAND
OVERLAND
INFILTRATION INTO FIELDS
MANAGED LAWN
DISPERSAL FROM ROOF
OVERLAND TO BIO-RETENTION
OVERLAND
BIO-RETENTION
TRADITIONAL STORM DRAIN SYSTEM
OVERLAND THROUGH WOODS
STONE CASCADE
STORM-WATER WETLAND
EXISTING SWALE

LID Implementation

- Identify and develop applicable regulations and requirements
- Use drainage/hydrology as a design foundation
- Allow designs that reflect conservation plans
- Reduce site imperviousness and minimize directly connected impervious areas
- Use sustainable integrated management practices
- Develop pollution prevention, maintenance, public outreach and education programs

Summary

- Development and stormwater runoff have degraded streams, fish habitat and water quality in Puget Sound.
- LID is a new approach to land development and stormwater management that helps protect water resources and watershed hydrology.
- We're gaining a better understanding of how LID can be used to protect the environment, reduce costs and make our communities more attractive.